Wildlife Biological Evaluation

Two Eagle Vegetation Management Project

La Grande Ranger District, Wallowa-Whitman National Forest

April, 2018

Authors:

_/s/ Laura Navarrete_____ Date _April, 2018_____
Laura Navarrete
District Wildlife Biologist
Wallowa-Whitman National Forest

WILDLIFE BIOLOGICAL EVALUATION

Introduction

An endangered species is an animal or plant species listed under the Endangered Species Act that is in danger of extinction throughout all or a significant portion of its range. A threatened species is an animal or plant species listed under the Endangered Species Act that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. A sensitive species is an animal or plant species identified by the Forest Service Regional Forester for which species viability is a concern either a) because of significant current or predicted downward trend in population numbers or density, or b) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. The R6 Sensitive Species list pertinent to this project is dated August, 2015. Threatened, endangered, and sensitive species effects are summarized in this report by TES status and species.

As part of the National Environmental Policy Act (NEPA) decision-making process, biological evaluations (BE) are required to determine how proposed FS management activities may affect Proposed, Endangered, Threatened, or Sensitive (PETS) species or their habitats (U.S. Forest Service Manual [FSM] 2670). This evaluation presents existing information on PETS species and their habitat in the project area, and describes the anticipated direct, indirect, and cumulative effects resulting from the proposed project. The review is conducted to ensure that FS actions do not contribute to the loss of species viability or cause a species to move toward federal listing (43 U.S.C. 1707 et seq). Threatened and Endangered species are managed under authority of the Federal Endangered Species Act (ESA) (36 U.S.C. 1531-1544) and the National Forest Management Act (NFMA) (16 U.S.C. 1600-1614). The ESA requires Federal agencies make certain all actions they authorize, fund, or carry out will not likely jeopardize the continued existence of any threatened or endangered species. Sensitive species are those recognized by the Region 6 Regional Forester as needing special management to meet NFMA obligations. FS policy requires a BE to determine possible effects to sensitive species from proposed management activities.

PRE FIELD REVIEW

The following proposed, endangered, threatened, or sensitive species (PETS) of wildlife are listed on the Regional Forester's Sensitive Species List (January 2015; Table 1). Only those PETS, or their habitats, known or suspected to occur in or immediately adjacent to the analysis area are addressed in this BE.

Table 1. PETS Species Review, WWNF and Two Eagle Project Area

Common Name	Scientific Name	USFWS Status	USFS Status	WWNF Occurrence/ Two Eagle Occurrence	Addressed Further in this BE
Amphibians					
ROCKY MOUNTAIN TAILED FROG	*Ascaphus montanus*		SEN	D/H	X
Tailed frogs are strongly adapted to cold water conditions. They occur in very cold, fast-flowing streams that contain large cobble or boulder substrates, little silt, often darkly shaded, and less than 20ºC (Bull and Carter 1996). Tailed frogs are known to occur in the project area in multiple streams.					
COLUMBIA SPOTTED FROG	*Rana leutriventris*		SEN	D/N	
This species is found at aquatic sites in a variety of vegetation types, from grasslands to forests (Csuti et al. 1997). Spotted frogs have not been documented in the project area and suitable habitat does not exist within the project area.					
Birds					
UPLAND SANDPIPER	*Bartramia longicauda*		SEN	S/H	
Suitable habitats in Oregon consist of large montane meadows ranging from 1,000 to 30,000 acres, generally surrounded by lodgepole pine (Marshall et al. 2003). The project area lacks suitable habitat, and no known sightings are reported for the area.					
AMERICAN PEREGRINE FALCON	*Falco Peregrinus Anatum*		SEN	D/N	
GREATER SAGE-GROUSE	*Centrocercus urophasianus*		SEN	S/N	
Suitable habitats are associated with sagebrush. The project area lacks suitable habitat and known sightings for sage grouse.					
BUFFLEHEAD	*Bucephala albeola*		SEN	S/H	
Known breeding range in Oregon is restricted to the Cascades. Breeding habitat consists of high-elevation lake or pond habitat surrounded by forest (ODFW 2006). The project area lacks suitable habitat, and no known sightings are reported for the area.					
BALD EAGLE	*Haliaeetus Leucocephalus*	DELISTED	SEN	D/H	X
Nesting habitat consists of large conifers within 1 km of water containing adequate supply of medium to large fish (Johnsgard 1990). No known nest sites exist within the project area. The project area does contain potential foraging habitat and the potential for species occurrence.					
LEWIS' WOODPECKER	*Melanerpes Lewis*		SEN	D/N	
Primary breeding habitats include open ponderosa pine, riparian cottonwood, and logged or burned pine (Tobalske 1997). No sightings are reported for the project area and there is no potential suitable habitat within the project area.					
WHITE-HEADED WOODPECKER	*Picoides Albolarvatus*		SEN	D/N	
Nesting habitat consists of open-canopy stands with mature and overmature ponderosa pine (Buchanon et al. 2003). Suitable habitat does not occur within the project area.					
COLUMBIAN SHARP-TAILED GROUSE	*Tympanuchus Phasianellus Columbianus*		SEN	D/N	

Potential habitats consist of bunchgrass prairies interspersed with stam bottoms containing deciduous shrubs and trees. The species was extirpated from Oregon, but has been reintroduced into northern Wallowa County (ODFW 2010). No sightings or potential suitable habitat occur within or adjacent to the project area. Occurrence within the project area is unlikely.					
MAMMALS					
CANADA LYNX	*Lynx Canadensis*	THREATENED		D/N	X
The species is classified as "not present" on the WWNF					
GRAY WOLF	*Canis Lupus*	DELISTED	SEN	D/H	X
Gray wolves are habitat generalists inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features.					
FISHER	*Martes Pennanti*		SEN	S/N	
Preferred habitat consists of late-successional conifer forests. No sightings have been reported for northeastern Oregon since 1976, leaving no evidence for an extant population in the Wallowa Mountains (Aubrey and Lewis 2003).					
CALIFORNIA WOLVERINE	*Gulo Gulo Luteus*	CANDIDATE	SEN	D/H	X
Preferred habitat consists of alpine and subalpine areas with little or no human presence. Confirmed sightings have been reported north of the project area within wilderness habitat. .					
TOWNSENDS BIG-EARED BAT	Corynorhinus townsendii		SEN	S/N	
This bat roosts in buildings, caves, mines, and bridges and the presence of suitable roost sites is more important than the vegetation type in determining the distribution of this bat. There are no known roost sites for Townsends within the Two Eagle project area.					
SPOTTED BAT	Euderma maculatum		SEN	S/N	
Spotted bats primarily rely on crevices and caves in tall cliffs for roosting which likely determine their distribution. The Two Eagle project area lacks tall cliffs, making occupancy unlikey.					
FRINGED MYOTIS	Myotis thysanodes		SEN	D/H	x
This bat is found throughout much of western North America and has been documented on the Wallowa-Whitman. Roosting in decadent trees and snags is common throughout it's range. The presence of large trees within the project area makes occurrence likely.					
MOLLUSKS					
FIR PINWHEEL	*Radiodiscus Albietum*		SEN	D/H	X
Most often found in moist and rocky Douglas-fir forest at mid-elevations in valleys and ravines (Frest and Johannes 1995). Recent surveys performed in the La Grande district have found the speices to exist on the Wallowa-Whitman forest. The presence of moist Douglas-Fir forests in the project area indicates habitat it available.					
COLUMBIA GORGE OREGONIAN	*Cryptomastix hendersoni*		SEN	S/N	
Land snail found in rather open and dry large-scale basalt taluses, generally at lower elevations. Most colonies occur at slope bases along the major river corridors, not in major tributaries. Associated vegetation includes *Celtus, Artemisia, Prunus, Balsamorrhiza,* and *Seligeria*. Surrounding vegetation is generally sage scrub. Generally in steep north or east-facing taluses, often only at the base. Occasionally found in meta sedimantary taluses as well (Frest and Johannes 1995). Lack of basalt talus makes the occurrence of this species unlikely.					
SHINY TIGHTCOIL	Pristiloma wascoense		SEN	S/H	X
Most sites for this species are in ponderosa pine and douglas fir forests at moderate to high elevations. Quaking aspen also provides habitat. Other Pristiloma species in the ecoregion are known to prefer moist microsites such as basalt talus accumulations, usually with riparian influence. Recent surveys have documented this species on the Wallowa-Whitman and potential habitat is present.					

INSECTS					
MEADOW FRITILLARY	*Boloria Bellona*		SEN	S/N	
The only known site in Oregon is located in Umatilla County (Fleckenstein 2006). The project area is located outside the known distribution of this species.					
SILVER-BORDERED FRITILLARY	*Boloria Selene*		SEN	S/H	
Suitable habitat consists of bog and marshes, often willowy sites, sometimes tall wet grass (Pyle 2002). Only three sites are reported for Oregon, one of which is located north of the town of Halfway on private land. The Halfway site is located about 5 air miles east of the project area. No larval host species are reported for the project area, and suitable habitat for this species is unlikely.					
JOHNSON'S HAIRSTREAK	*Callophrys Johnsoni*		SEN	D/S	X
Suitable habitat includes mistletoe on ponderosa pine, which is present in the project area. The species has not been reported for the project area, but has been reported in adjacent areas to the west and east, making occurrence likely.					
INTERMOUNTAIN SULPHUR	*Colias occidentalis pseudochristina*		SEN	D/N	
Suitable habitat consists of sagebrush with scattered Ponderosa Pine. No sightings have been documented and suitable habitat is not available in the project area.					
YUMA SKIPPER	*Ochlodes yuma*		SEN	D/N	
This species has been documented along the Imnaha River in Wallow Co. It is closely associated with its host plant Phragmites australis. Lack of the presence of the host species within the project area makes occurrence highly unlikely.					
WESTERN BUMBLEBEE	*Bombus occidentalis*		SEN	D/S	X
The western bumblebee is a habitat generalist and inhabits a wide variety of habitat types, associated with flowering plants. Recent surveys across the Wallowa-Whitman has found them to be distributed across multiple elevations and habitat types. No sightings have been documented within the project area but habitat and distribution indicates occurrence is likely.					

SEN = Sensitive.
[1]D = Documented occurrence, S = Suspected occurrence (USDA Forest Service 2009).
[2] K = Known to occur, S = Suspected to occur, H = Not known to occur, but habitat present, N = No habitat present and/or not present.

Methodology

In general, the analysis area is the same as the project area unless stated below for each species. For cumulative effects, past activities within the project area have been incorporated into the existing condition descriptions below. Present and reasonably foreseeable future actions are described in Appendix D of the EA. Those actions which overlap in time and space with the Two Eagle project which would have a measurable cumulative effect on each of these species are described in the cumulative effects discussions below.

ROCKY MOUNTAIN TAILED FROG (*Ascaphus montanus)*

Background Information- Tailed frogs are strongly adapted to cold water conditions. They occur in very cold, fast-flowing streams that contain large cobble or boulder substrates, little silt, often darkly shaded, and less than 20ºC (Bull and Carter 1996). Hatchlings are striking because they have no pigment and are almost transparent. Tailed frogs develop very slowly in the cold water, and tadpoles are two to five years old before they metamorphose (Corkran and Thoms 2006), and 7 to 8 years old before they reach sexual maturity (Bull and Carter 1996). Tailed frogs lay their eggs in streams in summer, attaching them under cobbles or boulder-sized rocks. Tadpoles cling to the undersides of moss-free small boulders or large cobbles. They are more

likely to be found lower in a stream than adults (Corkran and Thoms 2006). Adults often occur on streambanks at night and during wet weather.

Existing Condition

Tailed frogs are not known to occur in project area in Jim Creek, Main Eagle Creek, Two Color Creek, West Eagle Creek, Skookum Creek, Boulder Creek and Velvet Creek. but there are high gradient streams within the project area that could provide suitable habitat. Tailed frogs have been documented in the upper reaches of the Eagle Creek drainage.

Direct and Indirect Effects

Alternative 1 - Under alternative 1, the risk of wildfire or disease/insect outbreaks would continue to increase over time because there would be no changes to stand stocking levels or fuel loads from active management. Assuming no uncharacteristic wildfires or disease/insect outbreaks, there would be no effect to tailed frogs. Current fine sediment levels would likely be maintained in the short term because current management activities would continue. Conifers currently supply most of the streamside shade in the project area and stream temperatures would either remain the same, cool slightly with increased shade, or increase as a result of a large-scale high intensity wildfire. Wildfires could affect tailed frogs and their habitat by burning through riparian areas and removing existing vegetation that is currently providing bank stability and preventing erosion and sedimentation. The impact to tailed frogs would depend on the size and severity of the disturbance.

Alternatives 2, 2M and 3 - Discussion of these alternatives is combined because the effects would be similar. Standard INFISH RHCA widths will be utilized to protect aquatic habitat from measurable increases in fine sediment. All timber harvest activities are proposed for areas outside of RHCAs. Therefore, measurable increases in stream temperatures are not likely to result from proposed thinning activities.

Proposed burning activities will result in a low severity fire in RHCAs adjacent to perennial streams in the project area. This will be accomplished by burning when fuel moisture levels are high, not actively lighting fires in RHCAs, and allowing fires to back into RHCAs from adjacent upslope areas. These techniques result in low intensity fires that burn in a patchy distribution of burned and unburned areas in RHCAs. Trees killed by prescribed fire in RHCAs will primarily be understory trees (≤ 8" dbh). Understory trees of this size typically do not provide significant levels of stream shading.

The proposed burning in RHCAs adjacent to intermittent streams poses little risk of increasing stream temperatures because these streams are normally dry during the summer and fall months. Based on these factors, the Two Eagle Project is unlikely to result in a measurable increase in water temperature and a degradation of water quality in streams in the aquatic effects analysis area.

This project would not fragment wetland habitat, convert wetland habitat to upland habitat, or change the hydrology of a stream, spring, lake, or wetland habitat. This project would not involve the use of pesticides, herbicides, and similar potential contaminants within RHCAs or in or adjacent to wetland habitat which is outside of RHCAs.

Cumulative Effects

Alternative 1 - There are no cumulative effects from selecting this alternative. Any changes that would occur over time as a result of selecting this alternative simply reflect the evolving baseline conditions for the area.

Alternatives 2, 2M and 3- Discussion of these alternatives is combined because the effects would be similar. Grazing is ongoing throughout the analysis area. Overgrazing can negatively impact tailed frog populations by removing riparian vegetation, introducing sediment into the stream, and by trampling of individual frogs. However, the moderate grazing levels that occur within the analysis area do not negatively affect tailed frogs or contribute to a cumulative negative effect. Previous timber sales, prior to the implementation of the Screens standards, have likely caused a reduction in large woody debris and pool frequency in streams throughout the area, thereby reducing suitable habitat for tailed frogs. The Two Eagle project will not further reduce the number of pools or large woody debris in the stream so there will be no cumulative effect.

Determination

Common to all alternatives- None of the proposed activities (in any of the action alternatives) will degrade or impact potential habitat for this species. Any of the action alternatives may impact individual frogs **(MIIH)** but would not likely lead to a downward trend in the population or trend toward federal listing.

BALD EAGLE

Background Information

The bald eagle ranges throughout much of North America, nesting on both coasts and north into Alaska, and wintering as far south as Baja California. The largest breeding populations in the contiguous United States occur in the Pacific Northwest states, the Great Lakes states, Chesapeake Bay, and Florida. In Oregon, species numbers vary by season and include breeding, migration and wintering populations. The breeding season begins in late February or March, with juveniles fledging between mid-July and early September.

Nesting territories are normally associated with lakes, reservoirs, rivers, or large streams. In the Pacific Northwest recovery area the preferred nesting habitat for bald eagles is predominately uneven-aged, mature coniferous (ponderosa pine, Douglas-fir) stands or large black cottonwood trees along a riparian corridor. Eagles usually nest in mature conifers with gnarled limbs that provide ideal platforms for nests.

Existing Conditions

There are no known winter foraging areas within or adjacent to the project area (USDA Forest Service 2009). Review of the Oregon Natural Heritage database (ORNHIC 2009) shows no bald eagle sightings within or adjacent to the project area. The project area contains several streams, the largest of which (Eagle Creek) could possibly be utilized by bald eagles for occasional foraging.

Direct and Indirect Effects

Alternative 1 - There will be no direct adverse effects to bald eagles from the No Action Alternative because no timber harvest, fuel treatments, or transportation activities will occur.

Alternatives 2, 2M and 3 – Discussion of these alternatives is combined because effects would be similar. Potential impacts to bald eagles are similar under all action alternatives because no timber harvest or active lighting of prescribed fire will occur within 300 feet of perennial fish bearing streams under any alternative and log hauling and smoke from fuels treatments will occur under all action alternatives. Potential foraging in the project area could occur at Eagle Creek, although the likelihood of occurrence is low based on the lack of reported sightings. Intermediate treatments within one mile of Eagle Creek may benefit future bald eagle nesting habitat by accelerating tree growth and reducing risk of stand disturbance due to insect-outbreak and wildfire. Smoke generated by fuels treatments may be of sufficient density to temporarily displace foraging

eagles, but the impact would be of short duration. Increased human activity along portions of Eagle Creek due to log hauling and transportation-related activities may displace foraging eagles if present in close proximity to activities. However, the impact would be localized and temporary. In addition, risk of disturbance to foraging bald eagles is low for all activities due to a lack of past occurrence in the project area. If bald eagle use of the project area changes, this new information would be assessed and mitigations developed to protect newly discovered nests or roost sites.

Cumulative Effects

All alternatives - The area considered for cumulative effects is the project area, as well as the area within one mile of the project area boundary. One mile is the distance described as a threshold for disturbance of nesting bald eagles (USDA Forest Service 2009) and would encompass shorter disturbance distance for foraging eagles. All of the activities in Appendix D of the EA have been considered for their cumulative effects on bald eagles and their habitat. Ongoing and foreseeable activities considered in this cumulative effects analysis include firewood cutting, travel of open roads, summer and winter recreation, livestock grazing, and prescribed fire activities outside the project area. No measurable cumulative impacts to bald eagles are expected due to lack of negative impacts to available perching habitat.

Determination

All action alternatives would have no effect on bald eagle nesting or winter foraging/roosting. Due to the low level of eagle foraging activity along Eagle Creek, increased smoke levels due to fuels treatments and increased human presence associated with project activities may temporarily displace individuals, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH).

CANADA LYNX

Background Information

Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare, their primary prey (Ruediger et al. 2000). The primary vegetation that contributes to lynx habitat is subalpine fir where lodgepole pine is a major seral species, generally between 4,000-6,500 feet elevation. Cool, moist Douglas-fir, grand fir, western larch, and aspen forests may also contribute to lynx habitat when interspersed with subalpine forests. Dry forest types (e.g., ponderosa pine, climax lodgepole pine) are not considered habitat.

Lynx select dense patches of downed trees for denning (Johnson and O'Neil 2001). Large, course woody debris is a common element of natal den sites. Hollow logs and root wads provide protection and thermal cover for kittens. Denning habitat must be in or adjacent to foraging habitat to be functional (Ruediger et al. 2000). Jack-strawed piles of logs form a habitat matrix offering thermal cover, hiding cover, and hunting areas (Johnson and O'Neil 2001).

Existing Condition

The Blue Mountains represent the southern extent of lynx distribution, which would explain the rarity of this species on the periphery of its range both historically and presently. The presence of lynx in Oregon in the

late 1800s and early 1900s is documented by 9 museum specimens collected from 1897 to 1927 (McKelvey et al. 2000). Records after that are rare. Only 4 recent specimens are known, one from Wallowa County in 1964, one from Benton County in 1974, and one from Harney County in 1993 (McKelvey et al. 2000). Based on limited verified records, lack of evidence of reproduction, and occurrences in atypical habitat that correspond with cyclic highs, lynx are thought to occur in Oregon as dispersers that have never maintained resident populations. They are considered an infrequent and casual visitor by the state of Oregon (Ruediger et al. 2000).

Lynx habitat in northeastern Oregon is categorized as a "peripheral area", meaning there is no evidence of long-term presence or reproduction that might indicate colonization or sustained use by lynx, but that it may enable the successful dispersal of lynx between populations or subpopulations. The Forest is considered "unoccupied" habitat because there has not been a verified lynx observation since 1999. "Occupied" habitat is defined as requiring at least 2 verified observations or records since 1999 on the Forest or evidence of lynx reproduction on the Forest.

Direct, Indirect, and Cumulative Effects

Alternative 1 - The No Action alternative would have no direct, indirect, or cumulative effects on lynx or lynx habitat since no management activities are proposed.

Determination

There would be **No Effect (NE)** to the Canada lynx from any of the alternatives for this proposed project because this species is not considered present on the Forest (Wallowa-Whitman National Forest Lynx Strategy Letter April 19, 2007).

GRAY WOLF

Background Information

Gray wolves are habitat generalists inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features. Historically, they occupied a broad spectrum of habitats including grasslands, sagebrush steppe, and coniferous, mixed, and alpine forests. They have extensive home ranges and prefer areas with few roads, generally avoiding areas with an open road density >1.0 mi/mi^2 (Witmer et al. 1998). Dens are usually located on moderately steep slopes with southerly aspects within close proximity to surface water. Rendezvous sites, used for resting and gathering, are complexes of meadows adjacent to timber and near water (Kaminski and Hansen 1984). Both dens and rendezvous sites are often characterized by having nearby forested cover remote from human disturbance. Wolves are strongly territorial, defending an area of 75-150 mi^2, and home range size and location is determined primarily by abundance of prey. Wolves feed largely on ungulates and beavers, but will consume small mammals and fish to a lesser extent (Verts and Carraway 1998). Wolves are generally limited by prey availability and threatened by human disturbance. Generally, land management activities are compatible with wolf protection and recovery, especially actions that manage for viable ungulate populations.

Existing Conditions

The WWNF occurs within the historic range of the gray wolf, and a breeding pack (Catherine Creek Pack) has been identified as using the project area. Potential habitat and adequate prey occurs throughout the project area, and movement through the project area is likely.

Direct and Indirect Effects

Alternative 1 - There would be no direct, indirect, or cumulative impacts to wolves under the no-action alternative because no project activities would occur.

Alternatives 2, 2M and 3 - Discussion of these alternatives is combined because the effects would be similar**.** The primary threats to wolves are human disturbance, mortality from shooting and vehicle collisions (Wisdom et al. 2000). Primary concerns for the Forest Service are 1) disturbance to denning or rendezvous sites, and 2) providing adequate habitat for populations of prey species such as elk (USDA Forest Service 2009).

None of the action alternatives would affect wolves or their habitat because there is an abundance of prey and prey is not a limiting factor, and most FS management activities are compatible with breeding wolf populations with relatively minor considerations for disturbance at dens and rendezvous sites. No known den or rendezvous sites are located within the Two Eagle project area. For all action alternatives, treatments are not expected to impact big game prey availability (see Rocky Mountain Elk discussion).

Cumulative Effects

All alternatives - Because the home range of a colonizing wolf population can average 301^2 miles (Bangs and Fritts 1993) with dispersal movements up to 522 miles (Boyd and Pletscher 1999), the Eagle Creek, Powder River-Ruckles Creek, and Pine Creek watersheds (756^2 miles) define the cumulative effects analysis area. The only activity with potential cumulative impacts to wolves would be the implementation of the new Forest Plan. Management of motor vehicle use within the analysis area could have a positive effect on the distribution of elk, a primary prey resource for wolves. The TMP could reduce the density of designated motorized routes in all three watersheds as well as manage cross-country motor vehicle travel. Reduced road densities distribute elk across seasonal ranges during the proper season and may reduce the likelihood of wolves coming into contact with livestock on private lands. Ongoing livestock grazing on WWNF lands in the watersheds presents the potential for wolf-livestock interaction on these lands. However, potential wolf-livestock interaction is not cumulative to activities proposed under this project, because project activities are not expected to affect wolves.

Determination

Common to All Alternatives: There would be **No Impact (NI)** to the gray wolf from any of the alternatives from this project due to a lack of effects resulting from management activities.

CALIFORNIA WOLVERINE

Background Information

Wolverines in the southern portion of their range utilize high-elevation alpine portions of Washington, Idaho, Montana, Wyoming, and Colorado. They do not appear to need specific vegetation or geologic habitat features, but instead select for areas that are cold and receive enough winter precipitation to reliably maintain deep persistent snow into the warm season. Mean seasonal elevations used by wolverines in the Northern Rocky Mountains and North Cascades vary between around 4,600 and 8,500 ft. depending on location, but are always relatively high on mountain slopes. In the contiguous United States, valley bottom habitat appears to be used only for dispersal movements and not for foraging or reproduction (Federal Registrar 2013).

Wolverines are not thought to be dependent on vegetation or habitat features that may be manipulated by land management activities. They have been documented using both recently logged areas and burned areas. It is unlikely that wolverine avoid the type of low-use roads that generally occur in wolverine habitat

(Federal Register 2013). Additionally, the scale at which most land management decisions (including Forest Service vegetative management activities) occur is relatively small compared to the average size of a wolverine home range and although impacts to individual animals may occur, they do not rise to the level to be a threat to the population (Federal Register 2014). While there are no definitive effects currently known at the population level, there are on-going scientific investigations to better understand potential recreational impacts to wolverine.

On February 4, 2013, the U.S. Fish and Wildlife Service proposed to list the distinct population segment of the North American wolverine occurring in the contiguous United States, as a threatened species under the Endangered Species Act. On August 13, 2014, the USFWS withdrew its proposal to list the wolverine under the Endangered Species Act. As a result of this action, the wolverine automatically returned to the R6 Sensitive Species list. On April 4th, 2016 the district court of Missoula, Montana overturned the USFWS decision to withdraw the proposal. The wolverine is now considered a candidate species again

Existing Conditions

Adjacent wilderness areas including the Eagle Cap and North Fork John Day Wilderness are the nearest potential natal denning sites. There are no known den sites on the Forest (USDA Forest Service 2009). The Forest conducted extensive winter track surveys for wolverine and lynx from 1991 to 1994, and no wolverine tracks were found on what was formally-called the Pine RD, presently part of the Whitman RD (Wolverine and Lynx Winter Snow Track Reports, 1991-92, 1992-93, 1993-94). Surveys conducted on the WWNF during the winter of 2010/2011 detected 3 different wolverines, one of which was located in the southern Wallowa Mountains, north of the Two Eagle project area. Wolverine tracks were also confirmed near Summit Point (northeast of Two Eagle project area) during the winter of 2010-2011. Nearly all of the project area is well-roaded, facilitating human disturbance though access by motorized vehicles. Existing suitable habitat is located primarily in roadless and wilderness areas, north of the project area.

Direct and Indirect Effects

Alternative 1 - There will be no direct impacts to wolverine from the No Action Alternative because no timber harvest, fuels treatments, or transportation activities will occur.

Alternatives 2, 2M and 3 - Discussion of these alternatives is combined because the effects would be similar. Due to higher temperatures and increased summer human traffic, it is unlikely that wolverines would occupy portions of the project area that lie at lower elevations, south of the northern boundary, but movement through the project area is possible. The lack of lingering snowpack within the project area also minimizes the potential for wolverine denning. Forays into the project area would be more likely during the winter when human presence decreases due to snow, and potential food sources such as large ungulates move to lower elevations. Timber harvest operations, if conducted during the winter, could impact local presence and pattern of wolverine via disturbance, but impacts would be temporary. .

Cumulative Effects

All alternatives - Wolverines have large home ranges, estimated from studies in central Idaho to range from 26,000 to 128,000 acres (Banci 1994); corresponding to a cumulative effects area encompassing the project area and lands within a distance of 4.5 miles. Present and reasonably foreseeable future actions were analyzed for cumulative impacts to the species. Review of the FACTS database for the WWNF indicate that activities that may impact wolverine habitat within the Eagle Creek watershed and outside the project area within the past 10 years consist of underburning, pre-commercial thinning, and commercial harvest. Because wolverines are known to avoid roaded areas, these activities occur in areas unlikely to impact the species. Of the activities listed in Appendix D ongoing access and human use within the project area, and on lands to the east and west, may continue to preclude at least seasonal use by this species.

Determination

Past road construction has provided human access to portions of the project area that may have been utilized by wolverine historically. Activities proposed by the action alternatives would be undertaken primarily during the snow-free months when human presence is high and wolverine use unlikely. Winter timber harvest operations may impact presence and pattern of individual wolverine via disturbance. Project activities would not impact core habitats located in wilderness or roadless areas. Therefore, all action alternatives may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species (MIIH).

FRINGED MYOTIS (*Myotis thysanodes*)

Background Information

The fringed myotis ranges through much of western North America. It primarily occurs from sea-level to 9348 ft, but is primarily found at middle elevations (3936-6888ft). Distribution is patchy. It appears to be most common in drier woodlands (oak, ponderosa pine) but is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe (OOFarrel et al. 1980). They are known to roost in crevices in buildings, underground mines, rocks, cliff faces, and bridges but roosting in decadent trees and snags, particularly large ones, is common throughout its range. The fringed myotis has been documented in a large variety of tree species and it is likely that structural characteristics (e.g. height, decay stage) rather than tree species play a greater role in selection of a snag or tree as a roost (Weller and Zabel 2001). This myotis feeds on a variety of invertebrate taxa. The two most commonly reported orders in its diet are beetles and moths, however several potentially flightless taxa such as harvestmen, spiders, and crickets have been found in its diet. The presence of non-flying taxa in its diet indicates that they may glean prey from vegetation in addition to capturing prey on the wing. The potential to glean prey in concert with its wing-loading, flight style, morphological adaptations of wing and tail membranes, and design of its echolocation call indicate that the fringed myotis is adapted for foraging within forest interiors and along forest edges. The main threats for long term persistence of the fringed myotis is the loss or modification of roosting habitat. Removal of large blocks of forest or woodland habitat may also threaten the species due to its apparent propensity for foraging in and around trees (Bradley and Ports 1998).

Occurrence Information

There is no known records of fringed myotis in the project area. There are no known roost sites, or hibernacula or maternity colonies in the project area. While its occurrence in the project area is unknown, the presence of ponderosa pine forest and permanent water indicate potential habitat may exist.

EFFECTS ANALYSIS

Alternative 1- Under this alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. Assuming no uncharacteristic wildfires or disease/insect outbreaks, this alternative would limit habitat by perpetuating overstocked stand conditions. If uncharacteristic wildfire or disease/insect outbreaks occurred, the impact to habitat would depend on the size and severity of disturbance.

Alternatives 2, 2M and 3 - Discussion of these alternatives is combined because the effects would be similar. If fringed myotis occur in the project area, mechanical treatments and/or smoke from prescribed fire could result in the deaths of individual bats or cause them to shift spatially when foraging, but these treatments would also likely create habitat. Thinning stands typically benefits bats by increasing flight space in the stand and by promoting herbaceous growth for insect prey by increasing the amount of sunlight reaching the forest

floor (Taylor 2006). Fire can also improve foraging space and travel corridors by decreasing tree density and increasing openings, and can increase insect prey diversity and abundance by increasing plant growth. Roosting habitat would not be significantly effected as no snags $\geq$ 9" dbh or trees > 21 dbh (these trees represent future large snags) would be cut unless identified as imminent danger trees.

Cumulative effects

Ongoing and reasonably foreseeable activities within or near the project area include firewood cutting, grazing, prescribed fire, noxious weed treatment, road maintenance, and recreation (snowmobile, OHV use, mountain biking, dispersed camping, hunting). Of these activities, the ones that have the potential to impact roost trees are firewood cutting and prescribed fire. Firewood cutting occurs primarily along roads and does not target snags or trees over 21 inches dbh so it should not have a measurable effect on roost site availability. Prescribed fire outside the project area could eliminate suitable roost sites in addition to the roost sites that would be eliminated from burning and harvest within the project area. However, prescribed fire is staggered across multiple years and the area will continue to provide a mosaic of burned and unburned habitat and thus provide an abundance of roost sites for this species.

Determination- ***Common to all alternatives*****-** The alternatives **May Impact Individuals or Habitat (MIIH)** but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

SHINY TIGHTCOIL (*Pristiloma wascoense)*

Background Information

Most sites for this species are in ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) forests at moderate to high elevations (Frest and Johannes 1995). The eastern Washington record is from a relatively moist, shaded basalt cliff and with talus and *Populus* cover (Frest and Johannes 1995). Burke and Leonard (2009, *draft*) describe the habitat as primarily under deciduous trees, particularly quaking aspen (*Populus tremuloides*) and red alders (*Alnus* sp.).

Activities that compact soils or snow, disturb ground vegetation and/or litter, remove woody debris, alter temperature and/or humidity of the microsite, reduce canopy cover, or alter the water table could be deleterious to the habitat of *Pristiloma* species (Gowan and Burke 1999). These activities include livestock grazing, timber activities, recreational activities, mining activities, heavy equipment operation, water diversions and improvements, and construction operations (Gowan and Burke 1999).

Existing Conditions

This species is reported from many widely separate (but often imprecise) historic locations. It is known from the Washington and Oregon Cascades (Branson 1977, Frest and Johannes 1999, Branson 1980). It is also reported from the Blue Mountains in Oregon (Wallowa Valley above Wallowa Lake in Wallowa County) and from several counties in Idaho (Washington, Adams, Boise, and Shoshone) (Pilsbry 1946, Frest and Johannes 1999). Recent surveys on the WAW found this species distributed across the La Grande district.

This species is not known to occur within the project area but the presence of ponderosa pine/douglas fir forests indicate potential habitat.

Direct and Indirect Effect

Alternative 1 - There would be no direct, indirect, or cumulative impacts to this species under the no-action alternative due to a lack of proposed management activities.

Alternatives 2, 2M, 3 - Discussion of these alternatives is combined because the effects would be similar. Project design features that prescribe retaining a buffer from management actions in proximity to talus habitats are expected to avoid potential impacts to species' habitats if they do occur. Under Alternative 2 and 2M cottonwood restoration has been proposed on 7 acres within the project area. Removal of conifers that are encroaching on cottonwood stands allows the stand to grow, creating more terrestrial mollusk habitat in the medium-long term. Prescribed burning can have a negative effect on terrestrial mollusks depending on the severity and often it can take up to 25 years for re-colonization. Intense fire events can even require a century for post-fire recolonization. Within the project area there will be no direct lighting within RHCA's and the majority of potential habitat for this species is expected to not be severely affected by prescribed fire.

Cumulative Effects

All alternatives - Frest and Johannes (1995) describe grazing and roads along talus boundaries as impacting or extirpating former colonies. Grazing will continue within the project area in traditional areas, with no additional areas proposed under this project. Due to a lack of impact from activities proposed under the Two Eagle project, no cumulative impacts are expected.

Determination

Given the habitat and distribution descriptions provided by Frest and Johannes, this species and its habitats have a low probability of occurrence within the project area. With implementation of Project Design Features that reduce management actions within suitable habitats, this project may impact individuals or habitat but will not likely cause a trend toward Federal listing or a loss of viability of the population or species **(MIIH)**.

JOHNSON'S HAIRSTREAK (*Callophrys johnsoni)*

Background Information

Johnson's hairstreak butterfly is characteristic of mature to old growth conifer in the Pacific Northwest. Johnson's Hairstreak is also sometimes called the Mistletoe Hairstreak because the larvae of this butterfly feed exclusively on the aerial shoots of dwarf mistletoe, which is a highly specialized and adapted parasitic plant of a number of conifers. This may limit the butterflies' occurrence and distribution to trees in stands that are affected with dwarf mistletoe. This species is believed to spend the majority of its time in the top of the forest canopy. The distribution is largely restricted to the Pacific Northwest. Dwarf mistletoe infected conifers are common in northeastern Oregon, and current dwarf mistletoe levels are not believed to be substantially less than historic levels in this area.

Existing Conditions

There are 52 records in Oregon with the majority from 3,500 to 6,000 feet in elevation and west of the Cascade Range. A disjunct population is thought to be isolated in the Hells Canyon region of northeast Oregon and adjacent to Idaho. There are a few records south of the project area in Baker County (Schmitt

and Spiegel 2008). Additional local sightings are needed to document its range. It is unknown if this species occurs within the project area, however the species of mistletoe Johnson's hairstreak depends on is abundant throughout the forest and indicates potential habitat is available.

Direct and Indirect Effects

Alternative 1 – Under this alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. The amount of mistletoe would not be impacted in the short term, however, large stand replacing fires do have the potential to reduce available habitat for this species (James and Nunnallee 2011). The impact to habitat would depend on the size and severity of the disturbance.

Alternative 2, 2M and 3 – Discussion is combined because effects of alternatives would be similar. Under the action alternatives some trees that contain mistletoe would be removed to increase the health of the stands However, mistletoe is abundant within the project area and the level of trees removed will not significantly reduce the availability of host plants for this species. The use of the bacterium *Bacillus thuringiensis* var. *kurstaki* to combat defoliators in western forests is lethal to many butterfly and moth larvae when consumed. Use of BTK in Johnsons Hairstreak habitat is discouraged (Larsen et al. 1995), and the alternatives do not not propose to use BTK in the project area.

Cumulative effects- There are no reasonably foreseeable future activities that might affect Johnsons Hairstreak habitat in the project area. There would be no cumulative effects from selecting these alternatives because the potential direct and indirect effects would be limited to the time and location of project implementation and dwarf mistletoe habitat is considered common and comparable to historic levels in the area.

Determination-

Common to all alternatives- The alternatives **May Impact Individuals or Habitat (MIIH)** but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

WESTERN BUMBLEBEE (*Bombus occidentalis*)

Background Information

Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones. Relatively recent changes in land usage have compromised this habitat, putting pressure on bumblebee populations. In addition to habitat loss and fragmentation, overgrazing, climate change, pesticide use, competition with honey bees, and the introduction of nonnative pathogens are all thought to contribute to the population decline of all North American bumblebees. It is known to feed on sweet clover, rabbit brush, thistle, buckwheat and clover (Koch et al 2011).

Existing Conditions

The Western bumble bee is rare throughout much of its range and is in decline. Historically it was found from the Pacific coast to the Colorado Rocky Mountains but has seen severe population decline west of the Sierra-Cascade Crest. In Oregon, this species has been documented on Deschutes, Fremont-Winema, Malheur, Mt. Hood, Ochoco, Rogue River-Siskiyou, Siuslaw, Umatilla, Umpqua, Willamette, and Wallow-

Whitman National Forests, and BLM land in the Burns, Lakeview and Medford Districts. Given the relatively recent range contraction for this species, it is unknown what the current "Documented" status is for many of these field units, as many of the documented sites are considered historic. Surveys conducted on the La Grande district 2014-2015 found western bumblebees to be low in abundance, but present at about 50% of the surveyed sites.

There are a number of threats facing bumble bees which include; the spread of pests and diseases by the commercial bumble bee industry, other pests and diseases, habitat destruction or alteration (agriculture, urban development, grazing), pesticides and invasive species. The invasiveness and dominance of native grasslands by exotic plants may threaten bumble bees by directly competing with the native nectar and pollen plants that they rely on. In the absence of fire, native conifers encroach upon many meadows, which removes habitat available to bumblebees.

Direct and Indirect Effects

Alternative 1- Under this alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. Large stand replacing fires do have the potential to reduce available habitat in the short term for this species, though fire has been shown to be beneficial for pollinators (Panzer 2002). The impact to habitat would depend on the size and severity of the disturbance. Without active management, conifer encroachment into meadows would reduce the amount of habitat for bumblebees.

Alternative 2, 2M and 3- Discussion is combined because effects of alternatives would be similar. Thinning can increase gaps in the canopy which can facilitate positive understory plant diversity and cover, helping to increase food resources. Thinning over large areas should result in increased cover of understory plants which provides larger food patches with increased connectivity. However, heavy machinery can disturb and compact the soil which can have a negative effect on ground nesting bumblebees. Fire is positively correlated with plant diversity and pollinator visitation, with significant differences found in floral visitation rates between burned and unburned areas (Nuland et al.) However, prescribed fire can directly affect immature bumblebees that are confined to the nest through direct mortality. Fire can also indirectly affect bumblebees by burning litter and coarse woody debris that is used as nest sites. Proper timing of prescribed fire is important to maximize its benefits. Fall burning occurs during the mobile stage of the bumblebee life cycle and is likely to have the least negative impact (Nyoka 201). Fuels treatments would reduce the risk of stand replacing fire and encourage the return of low severity fire that can enhance meadow habitat and forb species.

Cumulative effects- Past events that affected potential Western bumblebee habitat include grazing and fire suppression and have been incorporated into the existing conditions. Present and proposed activities within the project area with a potential to affect the Western bumblebee are continuation of the current level of livestock grazing and prescribed burning. There would be no cumulative effects from selecting these alternatives because the potential direct and indirect effects would be limited to the time and location of project implementation.

Determination- ***Common to all alternatives***- The alternatives **May Impact Individuals or Habitat (MIIH)** but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

REFERENCES

Banci, V. 1994. Wolverine. *In* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinksi. The scientific basis for conserving carnivores, American marten, fish, lynx, and wolverine in the western United States. USDA Forest Service, Rocky Mtn. Forest and Range Exp. Stn., Gen. Tech. Rep. RM-254, Fort Collins, CO. pp. 99-127.

Bangs, E. E., and S. H. Fritts. 1993. Reintroduction of gray wolves to Yellowstone National Park and central Idaho. Endangered Species Tech. Bull. 18(3):1, 18-20

Boyd, Diane K. and D. H. Pletscher. 1999. Characteristics of Dispersal in a Colonizing Wolf Population in the Central Rocky Mountains. J. Wildl. Manage. 63(4): 1094-1108.

Branson, B. A. 1977. Freshwater and Terrestrial Mollusca of the Olympic Peninsula, Washington. The Veliger 19: 310-330.

Branson, B. A. 1980. Collections of gastropods from the Cascade Mountains of Washington. The Veliger 23: 171-176..

Bull, E.L., Carter, B.E., 1996. Tailed frogs: distribution, ecology and association with timber harvest in northeastern Oregon. United States Forest Service, Pacific Northwest ResearchStation, Portland, Oregon, Research Paper 497, pp. 11.

Burke, Thomas. 2013. Land Snail and Slugs of the Pacific Northwest. Oregon State University Press. Corvalis, OR 335 p.

Chandler, S.K., J.D. Fraser, D.A. Buehler, and J.K.D. Seegar. 1995. Perch trees and shoreline development as predictors of bald eagle distribution on Chesapeake Bay. Journal of Wildlife Management 59(2): 325-332.

Corkran, C. C., and C. Thoms. 2006. Amphibians of Oregon, Washington, and British Columbia. Lone Pine Publishing, Auburn, WA.

Csuti, B., A. J. Kimerling, T. A. O'Neil, M. M. Shaughnessy, E. P. Gaines, and M. M. P. Huso. 2001. Atlas of Oregon wildlife: distribution, habitat, and natural history. Oregon State University Press, Corvallis, OR. 492p.

Frest, T.J. and E.J. Johannes. 1995. Interior Columbia Basin mollusk species of special concern. Interior Columbia Basin Management Project. 274p.

Garrett, M.G., J.W. Watson, and R.G. Anthony. 1993. Bald eagle home range and habitat use in the Columbia River estuary. Journal of Wildlife Management 57(1): 19-27.

Gowan, D. and T. E. Burke. 1999. Conservation Assessment for *Pristiloma arcticum crateris*, Crater Lake Tightcoil. Originally issued as management recommendations; reconfigured September 2004 by N. Duncan. USDA Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington. Available online at http://webcache.googleusercontent.com/search?q=cache:RL5zD-oJXFwJ:www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/20050713-moll-crater-lake-tightcoil.doc+pristiloma+idahoense&cd=2&hl=en&ct=clnk&gl=us (Last accessed 29 June 2010).

Hawksworth, F.G. and D. Wiens. 1996. Dwarf Mistletoes: Biology, Pathology, and Systematics. Agriculture Handbook 709. USDA Forest Service, Washington, DC. 410p.

Hessburg, P.F., B.G. Smith, S.D. Kreiter, C.A. Miller, R.B. Salter, C.H. McNicoll, and W.J. Hann. 1999. Historical and current forest and range landscapes in the interior Columbia River Basin and portions of the Klamath and Great Basins. Part 1: Linking vegetation patterns and landscape vulnerability to potential insect and pathogen disturbances. Gen. Tech. Rep. PNW-GTR-458. USDA Forest Service, Pacific NW Res. Stn., Portland, OR. 357p.

James, David G. Nunnallee, David. 2011. Life histories of Cascadia butterflies. Oregon State University Press. Corvallis, OR. 447p.

Johnson, D.H., and T.A. O'Neil, Managing Directors. 2001. Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis, OR. 736 pp.

Kaminski, T., and J. Hansen. 1984. Wolves of central Idaho. Unpublished report. Montana Cooperative Wildlife Research Unit, Missoula, MT.

Kelson, R.V. and M.C. Minno. 1983. Observations of hilltopping *Mitoura spinetorum* and *M. johnsoni* (Lycaenidae) in California. Journal of the Lepidopterists' Society, 37:310-311.

Koch, Jonathan. Strange, James. Williams, Paul. 2011. Bumblebees of the Western United States. www.pollinator.org/books. 144p.

LaBonte, J.R., D.W. Scott, J.D. McIver, and J.L. Hayes. 2001. Threatened, Endangered, and Sensitive Insects in Eastern Oregon and Washington Forests and Adjacent Lands. Northwest Science, 75.

Marshall, B, M.G. Hunter, and A.L. Contreras, eds. 2003. Birds of Oregon. Oregon State University Press, Corvallis. 752p.

Miller, J.C. and P.C. Hammond. 2007. Butterflies and Moths of Pacific Northwest Forests and Woodlands: rare, endangered and management-sensitive species. FHTET-2006-07. USDA Forest Service, Forest Health Technology Enterprise Team. 234p.

ODFW. 2006. Oregon conservation strategy, conservation summaries for strategy species. Oregon Department of Fish and Wildlife, Salem, OR.

ORNHIC. 2009. Oregon Natural Heritage Information Center. Oregon State University, Corvallis.

Pilsbry, H. A. 1946. Land Mollusca of North America (North of Mexico), Academy of Natural Sciences of Philadelphia, Monograph 3, vol. 2(1): l-520.

Pyle, R.M. 2002. The Butterflies of Cascadia. Seattle Audubon Society, Seattle, Washington. 420p.

Raphael, Martin G., and Marshall White. "Use of snags by cavity-nesting birds in the Sierra Nevada." *Wildlife monographs* (1984): 3-66.

Raphael, Martin G., Michael L. Morrison, and Michael P. Yoder-Williams. "Breeding bird populations during twenty-five years of postfire succession in the Sierra Nevada." *Condor* (1987): 614-626.

Ruediger, B., J. Claar, S. Gniadek, and others. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication R1-00-53, Missoula, MT. 142 p.

Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires. 2000. The scientific basis for lynx conservation: qualified insights. Pages 443-454 *in* Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. S. McKelvey, and J. R. Squires, editors. 2000.

Ecology and conservation of lynx in the United States. University Press of Colorado, Boulder, CO. 480p.

Scott, J.A. 1986. The Butterflies of North America. Stanford University Press, Stanford, California. 583p.

Stalmaster, M.V. and J.R. Newman. 1979. Perch-site preferences of wintering bald eagles in northwestern Washington. Journal of Wildlife Management 43(1): 221-224.

Stebbins, R. C. 1985. The Peterson Field Guide Series: A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company, Boston, MA. 336 p.

Thomas, J. W., ed. 1979. Wildlife habitats in managed forests: The Blue Mountains of Oregon and Washington. Agricultural Handbook No. 553. USDA Forest Service. Washington D.C. 512p.

USDA Forest Service. 1990. Land and Resource Management Plan, Wallowa-Whitman National Forest. USDA, Forest Service, Pacific Northwest Region (R6), Wallowa-Whitman National Forest.

USDI Fish and Wildlife Service. 2011. Federally listed, proposed, candidate species and species of concern under the jurisdiction of the Fish and Wildlife Service which may occur within Baker County, Oregon. Last updated October 8, 2011. Accessed online October 12, 2011 at http://www.fws.gov/oregonfwo/Species/Lists/

Verts, B. J., and L. N. Carraway. 1998. Land mammals of Oregon. University of California Press, Berkeley, CA. 668p.

Wisdom, M.J., R.S. Holthausen, B.C. Wales, C.D. Hargis, V.A. Saab, D.C. Lee, W.J. Hann, T.D. Rich, M.M. Rowland, W.J. Murphy, and M.R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia Basin: Broad-scale trends and management implications, Vol. 2 – Group level results. Gen. Tech. Rep. Threatened and Endangered Species, Sensitive Species and Management Indicator Species and the level of analysis required. PNW-GTR-485.

Witmer, G. W., S. K. Martin, and R. D. Sayler. 1998. Forest carnivore conservation and management in the interior Columbia Basin: Issues and environmental correlates. Gen. Tech. Rep. GTR-PNW-420. USDA Forest Service, Pacific Northwest Research Station. Portland, OR. 51p.